Risk factors and complications in patients with hypertension/diabetes in a regional health district of northeast Brazil*

FATORES DE RISCO E COMPLICAÇÕES EM HIPERTENSOS/DIABÉTICOS DE UMA REGIONAL SANITÁRIA DO NORDESTE BRASILEIRO

FACTORES DE RIESGO Y COMPLICACIONES EN HIPERTENSOS/DIABÉTICOS DE UNA REGIÓN SANITARIA DEL NORESTE BRASILEÑO

Jênifa Cavalcante dos Santos[1], Thereza Maria Magalhães Moreira[2]

ABSTRACT

The objective of this study was to identify the risk factors and associated complications present in clients with hypertension/diabetes, enrolled in the HIPERDIA of the Executive Regional Health Department VI in Fortaleza, CE. This analytical documental study included 2,691 people. Of this total, 73.6% were women; 44.6% were between 60-79 years of age (mean age of 60.8 years); 87.4% were Caucasian, Asian or Pardo; 63.7% had eight or fewer years of education; 79.7% were non-smokers; 56.6% were considered sedentary; 59.6% were overweight/obese; and 48.4% had a family history of cardiovascular disease. An association was observed between having a sedentary lifestyle and being overweight/obese among patients with diabetes, and those with both diabetes and hypertension; family history of cardiovascular disease in patients with hypertension and those with both diabetes and hypertension; stroke, coronary artery disease and chronic renal failure in patients with hypertension and those with both diabetes and hypertension; and infarction and stroke in patients with diabetes. A family history of cardiovascular disease was associated with coronary artery disease and infarction. A relevant presence of risk factors and complications was found, highlighting the need for health education among clients.

DESCRIPTORS
Hypertension
Diabetes mellitus
Cardiovascular diseases
Primary Health Care
Nursing care

RESUMO

Objetivou-se com este estudo identificar os fatores de risco e complicações associadas presentes em usuários com hipertensão/diabetes, cadastrados no HIPERDIA da Secretaria Executiva Regional VI em Fortaleza, CE. O estudo documental analítico abordou 2.691 pessoas. Do total, 73,6% eram mulheres; 44,6% tinham 60-79 anos, com média de 60,8 anos; 87,4% brancos, amarelos ou pardos; 63,7% com até oito anos de estudo; 79,7% não fumantes; 56,6% sedentários; 59,6% com sobrepeso/obesidade; 48,4% possuíam antecedente familiar cardiovascular. Verificou-se associação entre sedentarismo e sobrepeso/obesidade com os diabéticos e diabéticos hipertensos; antecedente familiar cardiovascular com os hipertensos e diabéticos hipertensos; acidente vascular encefálico, doença arterial coronariana e insuficiência renal crônica com hipertensos e diabéticos hipertensos; infarto e acidente vascular encefálico com diabéticos. O antecedente familiar cardiovascular associou-se com doença arterial coronariana e infarto. Evidenciou-se a presença relevante de fatores de risco e complicações, destacando a necessidade da educação em saúde com os usuários.

DESCRITORES
Hipertensão
Diabetes mellitus
Doenças cardiovasculares
Atenção Primária à Saúde
Cuidados de enfermagem

RESUMEN

Se objetivó identificar factores de riesgo y complicaciones asociadas en pacientes con hipertensión/diabetes, registrados en el HIPERDIA de la Secretaría Ejecutiva Regional IV de Fortaleza-CE. Estudio documental analítico que abordó 2.691 personas; 73,6% de sexo femenino, 44,6% con 60-79 años, promedio de 60,8 años; 87,4% blancos, amarillos o trigueños, 63,7% con hasta ocho años de escolarización; 79,7% no fumadores, 56,6% sedentarios, 59,6% con sobrepeso/obesidad, 48,4% con antecedentes cardiovasculares familiares. Se verificó asociación entre sedentarismo y sobrepeso/obesidad con los diabéticos y diabéticos hipertensos; antecedentes cardiovasculares familiares con los hipertensos y diabéticos hipertensos; accidente cerebro-vascular, enfermedad coronaria e insuficiencia renal crónica con hipertensos y diabéticos hipertensos; infarto y accidente cerebro-vascular con diabéticos. Antecedentes cardiovasculares familiares se asociaron con enfermedad coronaria e infarto. Se evidenció presencia relevante de factores de riesgo y complicaciones, destacándose la necesidad de educación sanitaria a los pacientes.

DESCRIPTORES
Hipertensión
Diabetes mellitus
Enfermedades cardiovasculares
Atención Primaria de Salud
Atención de enfermería

OnLine Português / Inglês www.scielo.br/reeusp

INTRODUCTION

This study aimed at investigating the risk factors and associated complications occurring in patients registered in the HIPERDIA Information System of Patients with Hypertension and Diabetes of a Fortaleza sub-district office (*Secretaria Executiva Regional*), in the state of Ceará.

Considered to be a modern epidemic, *non-transmissible diseases and injuries* (DANT) (cardiovascular, cerebrovascular and ischemic diseases, neoplasms, chronic respiratory diseases and diabetes mellitus) are serious public health problems, in wealthy countries and in those of moderate and low prosperity. Nevertheless, it is a fact that developing and underdeveloped countries suffer more markedly because of their lower success rates in creating public health policies that positively influence the social health factors. In 2005, approximately 35 million people died of chronic diseases in the world, which represents double the number of deaths compared to infectious diseases[1].

Therefore, a major challenge for health professionals in the third millennium is caring for people suffering from chronic diseases. This challenge also affects nursing because nurses provide direct and continuous care to affected individuals.

Among the risk factors for cardiovascular disease are those that are considered modifiable (overweight and obesity, sodium intake, alcohol intake, sedentary lifestyle, socioeconomic factors, environmental factors) and those that cannot be modified (age, gender and ethnicity, genetics)[2].

Arterial hypertension (AH) is identified as a risk factor for cardiovascular complications in modern society[3], including sudden death, acute pulmonary edema, renal failure, acute myocardial infarction (AMI) and cerebral vascular accident or stroke (CVA), accounting for *54% of deaths by cerebral vascular accident and 47% of those by ischemic heart disease*[4].

The possible association between arterial hypertension and diabetes mellitus is approximately 50%, which often requires management of both diseases within the same patient, as their coexistence maximizes the resulting micro- and macrovascular damage, causing high cardio-cerebrovascular morbidity. In addition, arterial hypertension and diabetes mellitus also have other things in common: etiology, pathogenesis, risk factors, non-medical treatment, chronic nature, preventability, lack of symptoms in the early stages, lack of adherence to treatment, need for follow-up with a multidisciplinary team and ease of diagnosis [5].

In order to minimize damage from these diseases, the Ministry of Health has implemented the Plan of Reorganization of Care to Arterial Hypertension and Diabetes Mellitus by creating the HIPERDIA System, used in all Family Health Centers (CSF)[6].

The interest in the theme stems from previous studies developed by the Group of Epidemiology, Care in Chronicities and Nursing (GRUPECCE) of the State University of Ceará (UECE) [7-9].

Prior to justifying a joint approach to these diseases, a question arose: What are the risk factors and associated complications present in patients registered in the HIPERDIA of the VI Sub-District Office in Fortaleza, CE? Is there a difference in the risk factors and complications for those who have only hypertension, only diabetes or both diseases?

Therefore, the objective of this study was to identify the risk factors and associated complications present in users with hypertension, diabetes or both conditions, registered in HIPERDIA of the VI Sub-District Office in Fortaleza, CE.

> The possible association between arterial hypertension and diabetes mellitus is approximately 50%, which often requires management of both diseases within the same patient, as their coexistence maximizes the resulting micro- and macrovascular damage, causing high cardio-cerebrovascular morbidity.

METHOD

The study is characterized as a documentary, analytical, retrospective study using a quantitative approach, and was carried out utilizing all registration records from 2007 to 2009 involving hypertensive and/or diabetic patients from the 20 health units of VI Sub-District Office of Fortaleza.

The sample consisted of 2691 registration records of people with diabetes (Group A), with hypertension (Group B) and with both conditions (Group C). It is important to highlight that the data are derived from records that are not fully reliable, since accuracy depends on the individuals in charge of their completion. The registration records of HIPERDIA consist of the following variables: identification data, month and year of the consultation with the health teams at the primary healthcare units, sociodemographic characteristics (gender, age, race and education), presence of arterial hypertension, diabetes type 1 or type 2, and related/associated factors when one or both of these diseases are present, including family history, smoking and amount/frequency, sedentary lifestyle and whether the individual is overweight or obese. The parameters set for weight consider the body mass index (BMI), with classification as follows: normal (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2), obese class I (30 to 34.9 kg/m^2), obese class II (35 to 39.9 kg/m^2) and obese class III ($\geq$ 40 kg/m^2)[10]. In addition to the variables already mentioned, one must add the presence of clinical complications, such as acute myocardial infarction and other coronary disease, cerebral vascular accident and kidney disease. The completion of the records was the responsibility of the nurse and/or physician during the clinical consultation.

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The findings were entered into a database using an electronic spreadsheet and were analyzed statistically at the university, using the Statistical Package for Social Sciences (SPSS version 15.0), with application of the X^2 test (chi-square) for determination of statistical significance among categorical variables. The criterion of significance used was $p < 0.05$.

This research complied with the provisions of Resolution 196/96 of the National Health Council [11]. The project was submitted to the Research Ethics Committee at Universidade Estadual do Ceará (UECE) (review number 10029812 5). Data collection was performed only after the research was approved.

RESULTS

The analysis of 2691 records of patients seen at the family health centers allowed the authors to describe their sociodemographic characteristics, as presented in Table 1. It is noted that the patients were mainly women (73.6%). With regard to age, the age group from 60 to 79 years was the most frequently seen, comprising 44.6% users; 42.3% of the patients belonged to the age group from 40 to 59 years. We obtained an average of 60.8 years, with a standard deviation of $\pm$ 13.0.

Table 1 - Sociodemographic characterization of patients registered in HIPERDIA of a Regional Executive Secretary, from 2007 to 2009 - Fortaleza, CE, 2010

Variables	ƒ	%	Average	DP
Gender				
Male	711	26.4		
Female	1,980	73.6		
Age range				
< 20 years	04	0.1		
20-39 years	135	5.0		
40- 59 years	1,138	42.3		
60-79 years	1,200	44.6	60.8	$\pm$ 13.0
≥ 80 years	203	7.5		
Not completed	11	0.4		
Race				
White, Asian and "pardo"	2,352	87.4		
Black	184	6.8		
Indigenous	4	0.1		
Not completed	151	5.6		
Education				
Cannot read/write	614	22.8		
1 |-| 8 school years	1,713	63.7		
> 8 school years	258	9.6		
Not completed	106	3.9		
Family / marital status				
Lives with a partner/child/other family members	1,500	55.7		
Has no partner / no family members /	640	23.8		
Lives alone	125	4.6		
Not completed	426	15.8		

ƒ = Absolute frequency; % = Percentage frequency; DP = Standard Deviation.
Note: (n = 2,691)

Regarding race, 87.4% of the patients were characterized as white, Asian or *pardo*. As for education, 63.7% of patients had from 1 to 8 years of education, and 22.8% could not read or write, being able only to sign their name. As for their family situation, it was found that 55.7% of the patients lived with someone else, whether a partner, child, or other relatives.

For each observed variable, there were records that were not completed fully, thus the incomplete records in HIPERDIA ranged from 0.4% to 15.8% and were recorded.

In Table 2 there were identified risk factors and complications associated with arterial hypertension and/or diabetes mellitus in the study population. We performed X^2 test to determine possible statistical associations, as shown below.

It is important to clarify that when the users were categorized into Group A (n = 196), Group B (n = 1,386) and Group C (n = 660), 449 records were excludes, as the patient's clinical response did not appear. Therefore, the following tables refer to a total of 2,242 patients (n = 2,242).

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Table 2 - Characterization of risk factors and complications associated with hypertension and/or diabetes mellitus in patients at a Regional Executive Secretary, from 2007 to 2009 - Fortaleza, CE, 2010

Variables	Patient condition							
	DM (Group A)		HA (Group B)		DM+HA (Group C)		TOTAL	
	f	%	f	%	f	%	f	%
Risk factors								
Smoking								
Yes	30	1.3	210	9.4	85	3.8	325	14.5
No	165	7.4	1,173	52.3	448	20.0	1,786	79.7
Not Completed:							131	5.8
p-value	0.996		0.711		0.683			
Sedentary life style								
Yes	99	4.4	797	35.5	374	16.7	1,270	56.7
No	97	4.3	582	26.0	193	8.6	872	38.9
Not Completed:							100	4.4
p-value	**0.009**		0.058		**0.000**			
Overweight/obese								
Yes	89	4.0	854	38.1	393	17.5	1.336	59.6
No	103	4.6	506	22.6	164	7.3	773	34.5
Not Completed:							133	5.9
p-value	**0.000**		0.477		**0.000**			
Family history of CVD								
Yes	88	3.9	669	29.8	330	14.7	1.087	48.4
No	104	4.6	705	31.4	250	11.2	1.059	47.2
Not Completed:							96	4.4
p-value	0.162		**0.015**		**0.000**			
Complications								
Coronary disease								
Yes	4	0.2	49	2.2	50	2.2	103	4.6
No	186	8.3	1.310	58.4	478	21.3	1.974	88.0
Not Completed:							165	7.4
p-value	0.057		**0.000**		**0.000**			
Acute myocardial infarction								
Yes	2	0.1	47	2.1	49	2.2	98	4.4
No	188	8.4	1314	58.6	486	21.7	1.988	88.7
Not Completed:							156	6.9
p-value	**0.013**		**0.000**		**0.000**			
Cerebral vascular accident								
Yes	6	0.3	68	3.0	64	2.9	138	6.2
No	184	8.2	1.291	57.6	478	21.3	1.953	87.1
Not Completed:							151	6,7
p-value	**0.045**		**0.000**		**0.000**			
Kidney disease								
Yes	3	0.1	21	0.9	21	0.9	45	1.9
No	186	8.3	1.334	59.5	508	22.7	2.028	90.5
Not Completed:							169	7.6
p-value	0.564		**0.008**		**0.001**			

DM = diabetes mellitus, hypertension HA = f = absolute frequency,% = percentage frequency, CVD = cardiovascular disease. P-values highlighted refer to p <0.05.
Note: (n = 2,242)

In relation to smoking as a risk factor, although no statistically significant association was found in terms of the clinical conditions of the patients, smoking was more frequent in patients diagnosed with arterial hypertension alone (Group B = 9.4%). Most records (79.7%) showed a negative response to the smoking item, this risk factor being less frequent among patients with a diagnosis of diabetes mellitus (Group A = 7.4%).

We found that users who were sedentary were more likely to be hypertensive (35.5%), but the relationship between inactivity and the clinical conditions of the patients indicated a statistical association only for diabetes

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mellitus (p = 0.009) and diabetes mellitus occurring along with arterial hypertension (Group C with p < 0.001). It was found that the most frequent risk factor in the registration records was overweight/obesity, present in 59.6% of the patients, with the highest prevalence in the exclusively hypertensive users (38.1%). This risk factor presented a statistically significant association with diabetes and with diabetics plus hypertension (p <0.001).

Family history of cardiovascular disease (CVD) was observed in 48.5% of cases (29.8% in people with hypertension and 14.7% in those with hypertension and diabetes). This risk factor was associated with hypertension (p = 0.015) and diabetes in conjunction with hypertension (p <0.001).

The complications associated with hypertension and/or diabetes mellitus present in the records of HIPERDIA were also analyzed. It was found that 4.6% of the patients had coronary disease, with a higher prevalence in the records of Groups B and C (2.2% in each), showing a sta-

tistical association in these groups (p < 0.001). It was the second most frequent complication among the patients.

With regard to acute myocardial infarction, history was obtained in 4.4% of patients, more frequently in Group C (2.2%). Statistical testing showed an association of this risk factor with Groups A (p = 0.013), B and C (p <0.001).

Stroke was the most frequent complication among patients (6.2%), with prevalence among hypertensive patients (3.0%). Stroke was statistically associated with the three clinical conditions (p = 0.045 for diabetes mellitus and p <0.001 for the others). Kidney disease was a less frequent complication, with equal frequency (0.9%) between Groups B (p = 0.008) and C (p <0.001).

Finally, we investigated the relationship between the risk factors and complications associated with each of the clinical conditions of users, shown by the results presented in Table 3.

Table 3 - Relationship between risk factors and associated complications in the three populations studied in a Regional Executive Secretary for the period of 2007 to 2009 - Fortaleza, CE, 2010

Presence of risk factors		Associated Complications											
		Coronary disease			AMI			CVA			Kidney disease		
		DM	HÁ	DM+HA	DM	HA	DM+HA	DM	HA	DM+HA	DM	HA	DM+HA
Smoking	f	1	4	10	1	7	14	2	20	15	-	5	7
	%	0.04	0.18	0.45	0.04	0.31	0.62	0.09	0.89	0.67	-	0.22	0.31
	p-value		0.182			0.088			0.980			0.396	
Sedentary life style	f	2	27	27	-	26	33	3	48	43	1	15	12
	%	0.09	1.20	1.20	-	1.16	1.47	0.13	2.14	1.92	0.04	0.67	0.54
	p-value		0.957			0.074			0.456			0.395	
Overweight/ Obesity	f	2	31	27	-	28	28	2	44	31	1	12	13
	%	0.09	1.38	1.20	-	1.25	1.25	0.09	1.96	1.38	0.04	0.54	0.58
	p-value		0.626			0.178			0.234			0.578	
Family history of CVD	f	1	36	40	-	34	40	1	45	43	1	11	13
	%	0.04	1.61	1.78	-	1.52	1.78	0.04	2.01	1.92	0.04	0.49	0.58
	p-value		**0.026**			**0.025**			0.060			0.499	

(n = 2,242).

By submitting the risk factors and complications associated with hypertension and diabetes mellitus to the X^2 test, it was found that the presence of a family history of cardiovascular disease was significantly associated with coronary disease(3.43%) and acute myocardial infarction (3.30%) (p = 0.026 and p = 0.025, respectively), there being a higher percentage of people with such complications in Group C (1.78%). Despite the greater number of people with coronary artery disease and acute myocardial infarction associated with the presence of other risk factors, with respect to the presence of a family history of cardiovascular disease, stroke was the most frequent complication (3.97%), with the greatest number found in Group B (2.01%). Other risk factors did not show statistical associations with complications.

As for smokers, we can see a higher percentage of complications in Group C for coronary artery disease, stroke and

kidney disease, while stroke, a complication more prevalent among smokers (1.65%) was highest in Group B (0.89).

It is noteworthy that the highest percentages were of sedentary people who developed stroke (2.14% in Group B, 0.13% in A and 1.92% in C).

Regarding overweight/obesity, stroke was also the most frequent complication (3.43%), especially in Group B (1.96%).

DISCUSSION

Next, we will present and discuss the variables that showed statistical significance.

Regarding sedentary life style, this research demonstrated a predominance of sedentary subjects (56.6%, p < 0.0001)

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in the intersection of inactivity with the clinical condition in Groups A (diabetes) and C (hypertension and diabetes).

A follow-up study found that the development of hypertension was reduced in those who ran and/or practiced vigorous physical activity[12]. On the other hand, the risk proved to be higher in those who reduced physical activity and agrees with the high predominance of sedentary patients (60%) found in a research performed with 1,063 people of both genders, with or without diabetes mellitus[13].

This study investigated the risk factor of overweight/ obesity and its prevalence, which was observed in more than half of the patients, as well as its statistical association with Groups A and C. A study was performed with 675 hypertensive patients with and without diabetes registered in the HYPERDIA program at a Health Center in São Luís, MA, which detected a higher prevalence of individuals with a diagnosis of being overweight (38.0%) and obese (27.0%)[14]. A similar prevalence of excessive weight was found in hypertensive subjects from another study, with 75.4% of the subjects being overweight or obese[15]. In individuals with above-average weight, their weight may have been influenced by a genetic condition, social-economic status or life style[16].

Regarding a family history of cardiovascular disease, this study found such a history in almost half of the patients, showing a statistical significance in Groups B and C (p <0.05). Corroborating these results, a study found that 57.3% of patients had a history of cardiovascular disease among those who knew their history and could answer this item[13]. Another study found that 61% of the patients had a family history of coronary disease[16], just as in the FRICAS[17] study, which included 591 individuals and found 42.14% of the participants to have a family history of coronary disease.

Regarding the complications found in patients monitored at the healthcare facilities, this study examined relevant percentages. In a cross-sectional study conducted with data from 622 hypertensive patients, it was found that approximately 47.2% of men and 42.3% of women had at least one of the complications of hypertension considered in the analysis (i.e. kidney failure, cerebral vascular accident, left ventricular hypertrophy)[18].

Cardiovascular diseases, especially coronary artery disease, have been the main cause of death in Brazil. In 2007 there were 308,466 deaths from circulatory diseases[19]. With regard to coronary disease, it was found that this was the second most frequent complication among the patients. Of these, half of the patients were hypertensive and all others had both hypertension and diabetes, confirming the statistical association of this complication (p <0.001).

When the frequency of individuals with acute myocardial infarction was identified in this study, it was observed that this was the second most likely complication (4.4%) among the patients. Of these, half had hypertension associated with diabetes. This complication was statistically associated with the three clinical conditions of the patients, with values of p = 0.013 for Group A and p <0.001 for Groups B and C. In the FRICAS study[17], it was also noted that there was a significant association (p = 0.001) between the presence of diabetes mellitus and acute myocardial infarction, with 19.7% of diabetic individuals having suffered a heart attack. It is known that individuals with diabetes mellitus have silent myocardial infarction more often, as well as more complications post-infarction, including heart failure and cardiac autonomic neuropathy, attributed to diffuse involvement of coronary vessels in diabetes mellitus. It was found in a study of infarct patients that 27% of them had a diagnosis of diabetes mellitus[15].

As far as stroke, this has been occurring at an increasingly early age in Brazil. About 50% of hospitalized cases die, and 50% of those who survive are left with some degree of impairment. It is estimated that the number of new cases in the world varies from about 500,000 to 700,000 cases/year, with mortality ranging between 35 and 200 cases/100,000 inhabitants[6]. This research detected that this complication was the most frequent one (6.2%) among the patients in the records analyzed, with the majority being hypertensive, presenting a significant association with the three clinical conditions of the patients of this study (Groups A, B and C).

Regarding kidney failure, hypertension was found to be closely related, which may be the cause or consequence of kidney disease. In the present study, we observed that 1.9% of the patients presented with kidney disease, half of them having hypertension and the other half having both hypertension and diabetes. When a clinical case study was performed, aimed at illustrating the association between diabetes and hypertension, it was stated that hypertension is admittedly the most important risk factor for the progression of kidney disease in patients with or without diabetes[20].

With regard to Table 3 of this study, which lists risk factors for complications associated with hypertension and/ or diabetes, there was a statistically significant association between the presence of a family history of cardiovascular disease (CVD) and complications of coronary artery disease (CAD) and acute myocardial infarction (AMI) (p = 0.026 and p = 0.025, respectively). The study found that 3.43% of patients with a family history of cardiovascular disease had coronary artery disease, and 2.8% of patients with the same risk factor had had an acute myocardial infarction. An editorial of the Brazilian Archives of Cardiology reflects on cardiovascular risk factors in Brazil, citing studies that involve the theme, including the Framingham study, which was one of the first cohorts that demonstrated the importance of risk factors for cardiac and cerebral vascular disease that, at present, has been

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proposed by the Ministry of Health as an evaluation of cardiovascular risk[21]. The INTERHEART study, which was an international study systematically evaluating the importance of these risk factors in coronary disease throughout the world, found that the risk factors explained more than 90% of the risk attributed to acute myocardial infarction; among these factors, it is the cardiovascular family history[22] that was found to be most important. The AFIRMAR study, developed in 104 hospitals in 51 Brazilian cities, demonstrated almost identical findings[23].

Given the above, the importance of continuous monitoring of the patient by health professionals of primary care is clear, aimed at developing health promotion interventions and preventing complications, using health education, which directly addresses the risk factors present in each patient.

CONCLUSION

The study identified risk factors such as smoking, physical inactivity, overweight/obesity and a family history of cardiovascular disease, present in patients with hypertension, diabetes and in people with both diseases. Regarding complications, we found coronary artery disease, acute myocardial infarction, stroke and kidney disease present in patients with hypertension, with diabetes, and with both diseases.

The results of this study confirm the need to promote continuing education for healthcare staff involved in the treatment and monitoring of these patients, as it was observed that there was a significant percentage of patients having one or more complications in the cases we examined. This fact exposes the need for nurses to promote health education for patients in order to minimize the incidence of complications. Moreover, it is essential that the nurse investigates the health condition of the patients during consultations in order to identify early hypertension and/or diabetes, thus preventing the onset of complications.

It is also important to note that this study showed irregularities in the completion of registration records on the part of the patients entered into the Program for Attention to Hypertension and Diabetes, with absence of important data, suggesting the development of future studies that address, in more depth, the possible reasons that may justify such irregularities.

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Correspondence addressed to: Jênifa Cavalcante dos Santos
Rua G, 601 - Loteamento Expedicionários I - Bairro Itaperi
CEP 60745-580 – Fortaleza, CE, Brazil